PUTTER HEAD WITH PRE-MACHINED INSERT

This invention relates to a head for a golf putter. More particularly the invention is concerned with producing a head for a putter in such a manner as to allow expensive machining techniques to be used to provide the face of the putter with markings designed to facilitate the control of a golf ball during the putting stroke. Preferably the markings are confined to the sweet spot on the putter face.

In US patent 5275409 (Currie - 1994) there is disclosed a putter having a vertical flat machined surface extending between top and bottom surfaces. The vertical flat machined surface forms the striking face of the putter. According to this patent the process of machining provides a technique in which a very flat surface can be provided upon a putter head. However this patent laments the fact that machined putter heads are not common and have not been widely adopted because the machining process is so expensive.

US patent 3206206 (Santosuosso - 1965) discloses a putter head having a rectangular insert fitted within the putter head. The insert is grooved for contacting the ball. However, this design likewise does not seem to have gained wide acceptance in the art possibly because of the complexities of machining the rectangular opening in the putter head and then machining the insert to fit within the opening.

In US patent 5637044 (Swash) a putter head is disclosed having concentric grooves with a commom centre of rotation formed on the face of the putter. The grooves are described as being relatively shallow but even so have a depth typically of between 0.2 to 0.3mm. The grooves are said to impart advantageous spin to the ball.

According to the present invention there is provided a head for a putter, the head including a striking face having markings formed on at least a part of the putter face, the markings being of micron size.

Preferably the markings are curvilinear and non-concentric and are formed by a machining process, for example, a milling process. A milling cutter, for example an end mill may be passed over the surface.

The invention will now be describd by way of example only with reference to the accompanying drawings wherein:

Figure 1 shows a front perspective view of a putter head in accordance with one aspect of the invention.

Figure 2 shows a front perspective view of a putter head in accordance with a second aspect of the invention

Figure 3 shows a part sectional elevation of the putter head shown in figure 2.

Figure 4 is a perspective view of an insert for insertion into a putter head in accordance with the invention.

Figure 5 illustrates the curvilinear markings that may be formed upon the putter face in accordance with the invention.

Figure 6 illustrates a part cross-section of markings in accordance with the invention.

In figure 1 there is shown a putter head 2 in accordance with a first aspect of the invention. A shaft 3 is attached to putter head 2, for

example by suitable adhesive. Putter head 2 includes curved side surfaces 4, 5 and a curved rear surface 6 and has a striking face 7.

Dotted lines 8 denote an area including the sweet spot on the putter face 7 and has curvilinear surface markings 9 formed thereon by the machining method described below.

In figure 2 there is shown a golf putter 10 in accordance with a second aspect of the present invention. Golf putter 10 comprises a T-shaped head 11 connected to a shaft 12 by means of a hosel member 13. Hosel member 13 may be hollow as best seen in figure 3. A shaft connection may comprise the hosel member 13 or the hosel member 13 may be dispensed with and the shaft connection may comprise shaft 14 connected directly to head 11. A reinforcing ring 13A may be used to assist in connecting shaft 14 to hosel member 13. The head 11 comprises an outer shell member 15, best seen in figure 3 which defines a closed cavity 16 within head 11. A shoulder 17 is formed within the cavity 16. The putter head 11 includes a striking face 18. An important part of the present invention is the use of an elongate cylindrical inner insert member 19 set into or located within cavity 16 in the head 11. As seen in figure 4 inner insert member 19 has a front face 20 and a rear face 21 and a circular peripheral surface 22 joining the front and rear surfaces 20, 21. Peripheral surface 22 has two semi-circular grooves 23, 24 formed thereon for a purpose later to be explained. An aperture 25 is formed in insert 19 by drilling and reaming to receive and ensure a proper fit for either hosel 13 or shaft 14. As best seen in figure 3 hosel member 13 stops short of the end of the aperture 25 so that it does not contact the outer shell member 15. It is believed this arrangement enhances the transmission of impact energy to the putter shaft as "feel". A sweet spot 26 for the putter head 11 as indicated by the crossed lines 27 is arranged to be at the centre of area of the front face 20 of insert 19. Insert 19 is supported and fixed within cavity 16 by means of Neoprene

resilient O-rings 28, 29 (see Figure 3) fitted to the semi-circular grooves 23, 24 in the insert 19. A small clearance is left between the shoulder 17 in the cavity 16 and the rear face 21 of insert 19. Also as best seen in Figure 3 the O-rings 28, 29 space the insert 19 from the outer shell member 15 so that a small clearance 30 is formed between the periphery 22 of insert 19 and the outer shell member 15. Thus this in a sense insulates the insert member from the outer shell member so that impact energy is channelled directly through the insert member 19 to hosel 13 and hence up shaft 14 to be felt as "feel" in the golfer's hands. The rear surface 21 defines a blind bore or cavity 31 which together with the remainder of cavity 16 forms a void 32 within the head 11. This is thought to increase the resonance factor of the head thereby contributing to the "feel" of the putter. Stabilising or inertia weights 33 are let into the sides 34 of head 11 to minimise the effect of off-centre hits. A slot 35, see figure 2, assists in aiming the striking face 18 of the putter. In addition to resiliently fixing insert 19 within cavity 16 the O-rings act as seals to prevent dirt and moisture from entering through clearance 30 and acting on either side of the shaft connection 13 within cavity 25 they also protect this assembly. Shaft connection 13 enters aperture 25 in insert 19 through a drilled hole 36 in outer shell member 15.

The arrangement whereby insert 19 is located within cavity 16 by means of the resilient O-rings 28, 29 and thereby forms a part of striking face 18 provides a number of important advantages. For example, it means that the round peripheral surface 22 of insert 19 need not be made to tight tolerances, indeed it need not be machined atall with the result that insert 19 may be made from bar stock. Likewise since the rear surface 21 stops short of shoulder 17 within cavity 16 this need not be made to tight tolerances . Indeed since the rear surace 21 is hidden from view within the cavity 16 the end of the insert 19 need not be machined atall and may have an as-cut finish or as- cast finish as the

case may be. Any discrepancies in fit can be taken up by the resilience of the O-rings This means that it is the front surface 20 only forming the sweet spot that needs to be subjected to the expense of a machining procedure. Also the fact that the insert 19 can be pre- machined outwith cavity 16 and prior to installation therein means that the machining procedure can be considerably simplified.

Figure 5 shown greatly exaggerated for ease of explanation illustrates the characteristics of the surface markings formed on the sweet spot 26 on insert 19. As shown these are non-concentric curvilinear grooves having the cross - section shown in Figure 6 with a pitch (P) of 0.7mm.. The grooves or markings illustrated in Figure 6 are of Micron size (1 micron = 1 thousandth of 1mm). As used herein the term "micron size" is meant to convey the meaning of a depth (D) of markings or grooves several orders smaller than the smallest groove (0.2mm) disclosed in the above mentioned US patent 5637044 (Swash). That is a depth (D) of 0.05mm (50 microns) to 0.1mm for the present invention compared to depth of 0.2mm in the Swash patent. In a practical embodiment of the present invention with an insert diameter of 25.4mm a tungsten carbide end mill of 62mm diameter was passed once over the front surface of the insert. End mills having a diameter of between 25 and 76mm could be used in the practise of the invention. The curvilinear non-concentric markings produced by the end milling are of constant radius and present the same configuration to the golf ball as it moves relative to the putter face during a putting stroke. This is in contrast to the aforementioned Swash patent where the grooves radiating from a common centre point will result in presenting differing configurations to the golf ball. Also grooves or markings of this small order of depth could possibly allow face slippage if the putt is at an angle from the desired path of travel but the lightly curved lines will have a slightly self centralising effect.

The insert member 19 is made from a material selected to be a soft ductile material, for example bronze, which will facilitate the transmission of shock thereby conveying impact energy as "feel" to the golfer's hands. Outer shell member 15 and hosel member 13 are made of aircraft quality high strength aluminium (specification - 6082T6 (H30). The putter head of the present invention may be used with any conventional shaft but it can be most advantageously used in a putter with a substantially large diameter (between 25 and 45mm), thin walled (between 0.75 and 1mm), parallel shaft or a grip made therefrom to enhance the "feel" thereof. When such large sized shaft or grip is used the preferred material is carbon fibre.